I CLAIM AS MY INVENTION:

1. An input system for orientation in a visualization of a three-dimensional data set, comprising:

a selection unit to select a reference point, a direction unit to specify a direction, and a distance unit to set a distance value.

2. The input system according to claim 1 wherein the selection unit comprises a positioning to position a point on a two-dimensional surface and a sensor, the sensor registering a position of the point on the two-dimensional surface.

3. The input system according to claim 1 wherein the selection unit comprises a mouse, a two-dimensional movement of the mouse registered by the mouse corresponding to a movement of the reference point on a surface.

4. The input system according to claim 1 wherein the direction unit comprises a level tiltable in a direction and a sensor, the sensor registering a tilting of the level in the direction.

5. The input system according to claim 1 wherein the direction unit comprises a joystick tiltable in two directions, tilting of the joystick unambiguously specifying two angles for direction specification.

6. The input system according to claim 5 wherein the joystick is structurally connected with a mouse.

7. The input system according to claim 1 wherein the selection unit and the direction unit comprise a pointer wand whose position and orientation specify at least one of the reference point and the direction with respect to the visualization.

8. The input system according to claim 7 wherein at least one of the position and orientation of the pointer wand is measurable by means of ultrasonic elapsed-time measurements.

9. The input system according to claim 8 wherein the pointer wand comprises at least two ultrasonic transmitters, and the input system additionally comprises a receiving unit to receive ultrasonic signals and a synchronization unit to synchronize the ultrasonic transmitters and the receiving unit.

10. The input system according to claim 9 wherein the synchronization unit is connected by a radio connection with the ultrasonic transmitters of the pointer wand.

11. The input system according to claim 8 wherein the pointer wand comprises at least two ultrasonic reflectors, and the input system additionally

comprises an ultrasonic transmitter, a receiving unit to receive ultrasonic signals, and a synchronization unit to synchronize an ultrasonic transmitter and a receiving unit.

12. The input system according to claim 11 wherein the ultrasonic reflectors are designed such that they reflect an ultrasonic pulse with at least one of different strength and with characteristic pulse form, depending on a frequency of the ultrasonic pulse.

13. The input system according to claim 1 wherein the distance unit comprises a rotatable small wheel and a sensor to detect rotation.

14. The input system according to claim 1 wherein the input system also comprises a button to actuate a signal.

15. The input system according to claim 1 wherein the input system also comprises an output unit to output a signal that comprises preferred information about at least one of the reference point, the direction and the distance value.

16. A method to visualize on a monitor data points of a three-dimensional data set by use of an input system, comprising the steps of:

displaying the data set in a display region on the monitor;

in order to select a point in the display region of the monitor, with the input system selecting a reference point on a virtual surface of the display region, a geometric arrangement of the virtual surface with respect to the display region being known, also with the input system setting a direction in the display region from the reference point on the virtual surface to the point being selected, and also with the input system setting a distance value that specifies a distance in the display region from the reference point along said direction to the point being selected in the display region; and

manipulating a representation of at least a portion of a display of the data set in the display region, said portion being in an adjustable geometric relationship to the selected point in the display region of the monitor.

17. The method according to claim 16 wherein by pressing a button of the input device, the reference point, the direction, and the distance value are specified.

18. The method according to claim 16 wherein the data set is shown at least one of three-dimensionally perspectively on a 2D monitor and in three spatial dimensions on a 3D monitor.

19. The method according to claim 16 wherein the data set is generated by an imaging medical examination device.

20. The method according to claim 16 wherein the virtual surface at least partially spherically surrounds the display region of the monitor.

21. The method according to claim 16 wherein the virtual surface is divided with a coordinate system.

22. The method according to claim 21 wherein the coordinate system divides the virtual surface into degrees of longitude and latitude.

23. The method according to claim 16 wherein the direction is set by means of two angles whose base legs lie in two planes perpendicular to a tangential plane, the tangential plane at the reference point being tangent to the virtual surface.

24. The method according to claim 16 wherein the distance value is set with a rotation of a rotatable wheel registered by a sensor.

25. The method according to claim 16 wherein an arrow is highlighted in the display region whose tip lies on the selected point in the display region of the monitor.

26. The method according to claim 16 wherein the representation of the portion to be manipulated comprises a volume around the selected point in the display region of the monitor.

27. The method according to claim 16 wherein the representation of the portion to be manipulated comprises a volume along a connection line between the reference point and the selected point in the display region of the monitor.

28. The method according to claim 27 wherein a volume along the connection line between the reference point and the selected point in the display region of the monitor tapers conically on the selected point.

29. The method according to claim 16 wherein at least one part of the three-dimensional data set is shown as an opaque subject.

30. The method according to claim 16 wherein at least one part of the three-dimensional data set is shown in a skeletal grid representation.

31. The method according to claim 16 wherein the display region is shown transparent.

32. The method according to claim 16 wherein in the representation of the portion to be manipulated, degrees of transparency associated with corresponding data points are determined by a position of a data point in a frequency distribution of the three-dimensional data set in which a distribution of the data points is plotted over a characteristic value.

33. The method according to claim 32 wherein the frequency distribution comprises an intensity frequency distribution in which the distribution of the data points is plotted over the characteristic value, the characteristic value comprising signal intensity.

34. The method according to claim 16 wherein the display region containing the selected point comprises a surface, and the data points are shown transparent on a side of the surface.

35. The method according to claim 34 wherein the surface is a slice plane through the display region of the monitor.

36. The method according to claim 34 wherein the data points of the surface are shown two-dimensionally on a 2D monitor.

37. The method according to claim 16 wherein a characteristic value is associated with each data point, and the display region containing the selected point comprises data points that exhibit a similar characteristic value.

38. A display system to display a visualization of a three-dimensional data set, comprising:

an input system for orientation in the visualization of the three-dimensional data set, said input system comprising a selection unit to select a

reference point, a direction unit to specify direction, and a distance unit to set a distance value;

a visualization unit that generates a representation of the visualization by means of values input with the input system; and

a monitor that shows the visualization.

39. The display system according to claim 38 wherein the monitor comprises a 3D monitor.

40. The display system according to claim 38 wherein the visualization unit comprises a setting unit that sets at least one of the reference point, the direction, and the distance where these were respectively determined with the input system with regard to a virtual surface that, for its part, stands in known geometric relation with a volume displayed by the monitor.

41. The display system according to claim 38 wherein the visualization unit comprises an association unit that associates a point on a virtual plane with the selected reference point, and starting from the selected reference point a unit determines along the specified direction at the set distance value a point in the three-dimensional data set.

42. A method to visualize on a monitor data points of a three-dimensional data set by use of an input system, comprising the steps of:

displaying the data set in a display region on the monitor; and

in order to select a point in the display region of the monitor, with the input system selecting a reference point on a virtual surface of the display region, a geometric arrangement of the virtual surface with respect to the display region being known, also with the input system setting a direction in the display region from the reference point on the virtual surface to the point being selected, and also with the input system setting a distance value that specifies a distance in the display region from the reference point along said direction to the point being selected in the display region.

43. A method for graphical positioning of a slice to be measured by use of an imaging medical examination device in a three-dimensional data set of a preparation measurement, comprising the steps of:

implementing the preparation measurement with lower resolution, and displaying the data set; and

selecting a point and a slice to be measured defined by a geometric relation with respect to the selected point by the following steps

displaying the data set on the monitor;

with an input system selecting a point in a display region of the monitor by selecting a reference point that is projected on a virtual surface whose geometric arrangement is known with respect to the display region of the monitor, setting a direction starting from the reference point on the virtual surface to the point being selected in the display region of the monitor, and setting a distance value that

specifies a distance in the display region of the monitor from the reference point to the point being selected in the display region of the monitor; and

manipulating a representation of a portion of the display of the data set, the portion being in an adjustable geometric relationship to the selected point in the display region of the monitor.

44. The method according to claim 43 wherein the slice to be measured is highlighted as a contour line in the display of the visualization.

45. The method according to claim 43 wherein an appropriate slice image is shown two-dimensionally on a 2D monitor.

46. The method according to claim 43 wherein the slice to be measured is measured and displayed with an imaging medical examination system.

47. An input system for selecting a point in a visualization of a three-dimensional data set, comprising:

a selection unit to select a reference point;

a direction unit to specify a direction from the reference point to the point to be selected; and

a distance unit to set a distance value in said direction from said reference point to said point to be selected.